

DTIC FILE COPY

2

NAVAL POSTGRADUATE SCHOOL

Monterey, California

AD-A231 298



DTIC
ELECTE
JAN 30 1991
S B D

THESIS

COMPUTERIZED POINT-OF-SALES SYSTEM
MORALE, WELFARE, AND RECREATION DEPARTMENT
LONG BEACH, CALIFORNIA

by

James J. Coltellaro

June, 1990

Thesis Advisor:

Leslie J. Zambo

Second Reader:

Glenn Eberling

Approved for public release; distribution is unlimited.

01 1 28 049

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a REPORT SECURITY CLASSIFICATION Unclassified			1b RESTRICTIVE MARKINGS		
2a SECURITY CLASSIFICATION AUTHORITY			3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; Distribution is unlimited.		
2b DECLASSIFICATION/DOWNGRADING SCHEDULE					
4 PERFORMING ORGANIZATION REPORT NUMBER(S)			5 MONITORING ORGANIZATION REPORT NUMBER(S)		
6a NAME OF PERFORMING ORGANIZATION Naval Postgraduate School		6b OFFICE SYMBOL (If applicable) 36	7a NAME OF MONITORING ORGANIZATION Naval Postgraduate School		
6c ADDRESS (City, State, and ZIP Code) Monterey, Ca. 93943-5000			7b ADDRESS (City, State, and ZIP Code) Monterey, Ca. 93943-5000		
6a NAME OF FUNDING SPONSORING ORGANIZATION		6b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c ADDRESS (City, State, and ZIP Code)			10 SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO	PROJECT NO	TASK NO
			WORK UNIT ACCESSION NO		
11 TITLE (Include Security Classification) COMPUTERIZED POINT-OF-SALES SYSTEM MORALE, WELFARE, AND RECREATION DEPARTMENT LONG BEACH, CALIFORNIA					
12 PERSONAL AUTHOR(S) Coltellaro James J					
13a TYPE OF REPORT Master's Thesis		13b TIME COVERED FROM TO	14 DATE OF REPORT (Year, Month, Day) June 1990		15 PAGE COUNT 42
16 SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.					
17 COSAT CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB GROUP	Computerized Point-Of-Sales, Inventory Control, Cash Management		
19 ABSTRACT (Continue on reverse if necessary and identify by block number) This is a study to determine the need for a computerized Point-Of-Sales system for the Navy Golf Course Pro Shop located in Long Beach, California. All facets of the Pro Shop's operations were examined including inventory control and cash management. An analysis into which particular system to procure was based on the ability to solve current problems, acquisition costs and the ease of installation and training.					
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED UNLIMITED <input type="checkbox"/> SAME AS REPORT <input type="checkbox"/> OTHER			21 ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a NAME OF RESPONSIBLE PARTY Leslie Zambo			22b TELEPHONE (Include Area Code) 408-646-4100		22c OFFICE SYMBOL 36

Approved for public release; distribution is unlimited.

Computerized Point Of Sales System
Morale, Welfare, and Recreation Department
Long Beach, California

by

James J. Coltellaro
Lieutenant, United States Navy
B.S.C.E. Villanova University

Submitted in partial fulfillment
of the requirements for the degree of

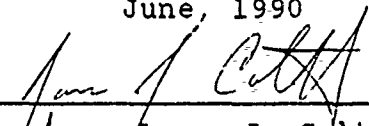
MASTER OF SCIENCE IN (Financial Management)

from the

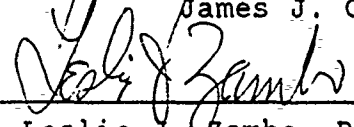
NAVAL POSTGRADUATE SCHOOL

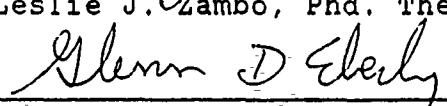
June, 1990


Author:


James J. Coltellaro

Approved by:


Leslie J. Zambo, Phd. Thesis Advisor


Glenn D. Eberling Second Reader


David R. Whipple, Chairman, Department
of Administrative Sciences

ABSTRACT

This is a study to determine the need for a computerized Point-Of-Sales system for the Navy Golf Course Pro Shop located in Long Beach, California. All facets of the Pro Shop's operations were examined including inventory control and cash management. An analysis into which particular system to procure was based on the ability to solve current problems, acquisition costs and ease of installation and training.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



TABLE OF CONTENTS

I.	INTRODUCTION.	1
	A. BACKGROUND	1
	B. OBJECTIVES	1
	C. RESEARCH QUESTIONS	1
	D. METHODOLOGY.	2
	E. ORGANIZATION OF STUDY.	3
II.	NAVY PRO SHOP-LONG BEACH CALIFORNIA	4
	A. THE PRO SHOP.	4
	B. CURRENT SITUATION/PROBLEM AREAS	4
III.	ALTERNATIVES.	7
	A. POSSIBLE SOLUTIONS	7
	B. LIKELY BENEFITS FROM A COMPUTERIZED POINT-OF-SALES SYSTEM	7
IV.	SYSTEM PROPOSALS.	12
	A. REQUEST FOR BIDS.	12
	B. RADIO SHACK PROPOSAL 01-3808.	15
	C. COMPUTERLAND.	21
	D. CTS CASH REGISTER AND TERMINAL SYSTEMS.	22
IV.	RECOMMENDATIONS	23
V.	CONCLUSION.	26

APPENDIX A (INSTALLATION)	27
APPENDIX B (TRAINING)	29
APPENDIX C (PURCHASE ORDERS)	30
APPENDIX D (FINANCIAL STATEMENTS)	33
LIST OF REFERENCES	35
INITIAL DISTRIBUTION LIST	36

I. INTRODUCTION

A. BACKGROUND

The Long Beach Naval Base Morale, Welfare and Recreation Department (MWR) commissioned a study to determine the need for a computerized information system for their Golf Course Pro Shop located at Cypress, California. If the need is warranted, the MWR Department requested a study to determine which particular system to procure along with assistance with installation and training. [Ref. 1] Given the current economic climate and the reduction of appropriated funds available for recreation facilities, every effort to maximize efficiency, reduce costs and increase customer satisfaction will be considered during the study.

B. OBJECTIVES

The focus of this thesis is the determination of the need for a computerized information system for the Pro Shop, the benefits from such a system and if needed, which system to procure.

C. RESEARCH QUESTIONS

The primary research questions include:

1. Does the need exist for a computerized information system?

2. What will be the benefits if such a system is installed?
3. If needed, which system should be procured?

Subsidiary research questions that will be investigated:

1. How is the in place system operating and in what areas can it be improved?
2. What is the cash management policy?
3. Will accounting functions be incorporated into the computerized system?
4. If a computerized system is deemed necessary, how will training be conducted?

D. METHODOLOGY

All facets of the daily operations at the Pro Shop were carefully examined. Accounting records were audited along with cash management monitoring. Inventory controls, vendor participation, lead times, storage capabilities, and quality of merchandise all were evaluated. Store personnel were interviewed concerning stockouts, physical inventories, perceived customer satisfaction and current efforts required to keep the shop operating. Customers were queried concerning desired additions or deletions to current services provided. Computer systems available from several vendors were evaluated on the basis of satisfying the needs of the shop, ease of installation/training and acquisition costs. This is an implementation guide for use by the Pro Shop. If deemed necessary, the Pro Shop is going to have a

fully functional computerized system installed, tested, and operating with trained personnel by completion of the thesis.

E. ORGANIZATION OF STUDY

The study is organized into six chapters as follows:

- Chapter II, Navy Pro Shop-Long Beach California. A brief description of the Pro Shop and its problem areas.
- Chapter III, Alternative Solutions. A discussion of alternatives available to solve problems described in Chapter II and author's recommendations.
- Chapter IV, System Proposals. This chapter will describe the request for bids and proposals received from the various vendors.
- Chapter V., Recommendations. This chapter will analyze the system proposals and make recommendations as to which to procure.
- Chapter VI, Conclusions. This chapter will detail any decisions made by the Morale, Welfare, and Recreation, Department and status of procurement/installation.

II. NAVY PRO SHOP-LONG BEACH, CALIFORNIA

A. THE PRO SHOP

The Navy Golf Course Pro Shop, is physically located at Cypress California, 23 miles from the Long Beach Naval Station. It's current inventory includes approximately 800-1000 item categories valued at \$100,000. Total revenues average \$300,000 annually, approximately twenty-five percent from retail sales and the other seventy-five percent from greens fees and services. (For a complete breakdown of income and expenses see Appendix D.) Total employment is forty-five personnel, thirty-five who maintain the course with the other ten running the Pro Shop. At any one time there are three to five people per eight hour shift in the shop, which usually includes the manager or golf professional.

B. CURRENT SITUATION/PROBLEM AREAS

Currently, a physical inventory is manually performed every quarter by Pro Shop personnel. The process is time consuming and labor intensive, requiring the closure of the Pro Shop for two days while the entire staff work eight hours a day to complete the task. Estimated costs include \$850.00 for labor and the loss of approximately \$3,000.00 in potential sales. [Ref. 2] Following the inventory, local

records are posted on a Tandy 6000 computer, orders are placed for depleted stock with purchase orders sent via guard mail to the MWR department's central accounting office located at the Naval Base, Long Beach. Due to limited storage space, shop managers have no way of optimizing their space with items that move quickly and customers are forced to do without the Pro Shop's services during the two day inventory.

In addition to not managing inventory correctly, the shop has a significant cash handling problem. Every month the shop is routinely several hundred dollars over or under what the register tapes indicate, averaging 3.7 percent of total revenues for 1989, (Appendix D.) This is partly due to the physical layout of the current cash register with four mechanical cash drawers located below the counter-top and the fact that as many as three clerks at one time may have access to the cash register. The cash register is capable of handling four separate clerks and the four cash drawers, but in the hustle to serve the customers, money is mistakenly taken from and placed into the wrong drawer. This makes it impossible to balance the cash receipts with the register totals, and could invite fraud.

The third and most important problem facing the shop is customer satisfaction. As discussed above, there is usually much confusion behind the counter which usually leads to longer than needed lines. Clerk confusion over prices,

customer confusion over what he exactly wants or needs and the extra people behind the counter all add up to delays and irritation. This is not the way to start a relaxing game of golf.

In today's competitive environment, the Pro Shop can not afford to close its doors to business nor operate in an inefficient manner. It must stay up-to-date on buying trends, competitive activity, and, most of all, its own sales and cost situation.

III. ALTERNATIVES

A. POSSIBLE SOLUTIONS

Several options exist to alleviate the current problems associated with the Pro Shop; they include: hiring more staff, reorganizing management, increasing training, automating the cash register/accounting functions or any combination of the above.

Adding more personnel to shop staff would increase cost and inefficiencies; there are already too many staff personnel behind the counter. The current manager started as a maintenance man when he was sixteen, had advanced to grounds keeper, then to assistant supervisor and finally to overall manager, devoting twenty-five years to the Navy Golf Course. No individual knows the course better, its operating procedures, or its relationship with MWR or its clients. Training needs to be increased in both proper cash handling procedures and efficient inventory control. A computerized information system or "point of sales system" in conjunction with increased training and supervision should provide for a more efficient, professional operation.

B. LIKELY BENEFITS FROM A COMPUTERIZED POINT-OF-SALES SYSTEM

A computerized point-of-sales system is intended to give the shop manager the information needed to make critical

decisions in a timely manner to increase sales, raise profits and, more importantly, increase customer satisfaction. "Point-of-sale" is a software program that provides cash register functions on a computer workstation. The point-of-sales system handles all aspects of the retail operation, from sales transactions to monthly financial statements.

The point-of-sales system should provide the following immediate benefits to the Pro Shop:

- Collect information at the register regarding sales and inventory, (ie. identify how much each clerk sells, which days or time of day is best for moving the most inventory, etc.)
- Provide current inventory and customer information available to checkout staff, (ie. has the individual's custom order been received yet, are a certain brand of golf balls available from the stock room, etc.)
- Reduce costly checkout errors and help to control inventory.
- Improve cash and merchandise controls and accounting efficiency.
- Improve the timeliness and accuracy of sales analysis reports.

Sales analysis is improved by:

- Displaying sales and receipts for the day, week, month, or year-to-date.
- Displaying sales by register, department, salesperson,

method of payment, or other customized categories.

- Producing historical reports based on sales activity, customers, inventory, or cashier performance.

The system should increase accounting efficiency and reduces accounting costs by:

- Automatically transferring accounting information to the general ledger.
- Maintaining detailed accounting records.
- Printing financial statements in formats designed by the user.

A computerized point-of-sales system requires each clerk to enter a four digit code before each sale, thus allowing only one drawer at a time to open, reducing the possibility of cash mishandling. Management is able to generate reports indicating sales by clerk, sales by the hour, sales by the day, etc., with exact amounts of cash to be in each drawer.

In addition to the basic information system, a faster means of entering the data into the computer will greatly reduce waiting time in the checkout line. Bar codes provide a faster, more accurate, more cost-effective means to enter information into the computer data based system. A structured series of black bars and white spaces creates each bar code. An input device, commonly a light pen, reads the bar code in either direction. Each item of inventory has a human readable label as well as a computer generated bar code which will be read by the light pen, entered into

the computer with a sales slip printed for the customer. Audible and visual signals instantly confirm a "good read." The decoder then inputs the bar coded information into the computer, just as though it were typed on the keyboard. This method saves time and money with improved asset management, increased productivity, and dramatically improved data accuracy. The computerized system, with bar code reader, provides fast, efficient customer checkout, speeding the customers through the line and onto the first tee. In addition to merchandise purchased, non-tangible items such as a round of golf, lessons, or club cleaning has a bar code laminated to the counter top to record the sale. Anything that will make the customers happy and willing to return to play "another round" is considered important.

Long term benefits include reduced operating costs both for the Pro shop and the Morale, Welfare and Recreation Accounting Department at the Naval Station. This is accomplished by an increase in efficiency at the Pro Shop with the possible reduction in the number of clerks required per shift and by a significant reduction in the manhours required to analyze the shop's daily reports. Even more significant savings will be realized when an electronic modem is installed at the Golf Course and at the Accounting Department. The routine accounting data will be transferred electronically over the telephone wires. Installation of

this system enhancement is anticipated within one year after the start of on-line operations.

With plans for future expansion underway, a computerized Pro Shop will be on the cutting edge of retail golf course management. The large retailers such as Nevada Bob's and the public courses do not have computerized point-of-sales systems. Given the advantages associated with a computerized point-of-sales system, the estimated cost savings of approximately \$4,000 per quarter by the elimination of the quarterly inventory and the anticipated improvement in customer service, the decision was made to submit requests for bids for a computerized system.

IV. SYSTEM PROPOSALS

A. REQUEST FOR BIDS

A "Request For Bids" was sent to several local computer firms, (Tandy Corporation, Computerland, PC People, Legacy Computer Systems, MicroAge, ComputerCraft, and Computer Works,) keeping in mind the need to transport the system to the Long Beach area. Also investigated was Cash Register and Terminal Systems, a Huntington Beach company that sold the Golf Course its current electronic cash register, a Sharp ER-3300.

Based upon initial observations of the Pro Shop, the number of items of inventory, annual sales and anticipated future expansion, a 286 based microprocessor was considered to be the ideal combination of power and affordability. Software would have to be simple to operate and be able to produce reports compatible with current accounting practices and Navy MWR regulations. The system would have to be able to:

- Record sales and returns.
- Register correct prices, even for quantity discounts, special customers or limited-time promotions.
- Price merchandise by either key entry or laser scanner/bar code.

- Identify merchandise by number, department, or description.
- Automatically add state and local sales taxes.
- Print sales receipts, payment receipts, and invoices.
- Correct or void sales.
- Accept combined payments of cash, checks, credit cards, vouchers, and coupons.
- Record balances in cash drawers.

The machine would have to be durable and backed by a significant warranty. Installation and training would have to be provided. Based on above requirements and the fact that the system would cost over \$2,000, the following "Request For Bids" was submitted:

REQUEST FOR BIDS

System Requirements:

A PC/AT for controlling inventory and cash flow while acting as a Point-Of-Sale System for a small retail operation with approximately 1000 items of inventory worth \$100,000 and sales of \$300,000 annually. The system must be easy to operate, must be able to interface with current Sharp ER-3300 cash register and should be expandable to be able to use network software in the future.

Specific Hardware/Software Requirements:

- 16-bit 80286 microprocessor at 10 MHz with built in real-time clock with battery backup.
- system key lock
- 640 K RAM expandable to 16MB
- One 3.5" 1.44 MB Floppy Drive
- 40 MB Hard Disk with controller
- 4 16-bit and 3 8-bit expansion slots
- 12" Monochrome Monitor with monochrome graphics card
- 101 key enhanced keyboard
- One serial and one parallel port
- 60 MB Tape backup including one tape cartridge
- 24 Pin dot matrix printer and cables
- 250 W backup power supply
- MS-DOS/GWBASIC 3.30
- Barcode Scanner--Lightpen
- POS Software with sales analysis capability--must be able to print and read bar codes; ease of use #1 priority.
- 1-year on site warranty
- **Training and Support
- **System Installation

POINT OF CONTACT: JIM COLTELLARO

125 SURF WAY APT 409

MONTEREY, CA 93940

408-649-8959

The following are proposals received and a in-depth description of each system outlining strengths and weaknesses along with conformity to the Pro Shop's needs.

B. RADIO SHACK PROPOSAL 01-3808 [Ref. 3]

Tandy Corporation (Radio Shack) was the most helpful, and with the help of a system engineer, designed three integrated systems which came closest to meeting the needs of the Pro Shop. The following is Tandy's response to the request for bids:

Radio Shack 01-3808

1050 Del Monte Center

Monterey, Ca 93940

Proposal For: Navy Golf Course

MWR, Long Beach, California

System Requirements:

A PC/XT for controlling inventory, cash flow, and a segregated customer list divided by military rank, while acting as a Point-Of-Sale System. The system should be easy to operate, able to interface with the customer's electronic cash register, and should be expandable to be able to use network software in the future should the need arise.

Proposal:

Taking into account that there will be a turnover of employees from time to time, training key supervisors is

essential to the successful operation of the system. Hardware should be kept to a minimum, with a fixed disk drive running the system while in use, a tape back-up system to be used daily, should there be a system failure. We suggest that back-up tapes be kept at a separate location in a fireproof vault.

From previous experience, we suggest a simple yet powerful computer system, supported by training, and on-site service.

In the case of future expansion into a multi-user system from DOS, it is easiest and least expensive to change over to SCO XENIX, as SCO has provided data translation software for this purpose. Additionally, by choosing SCO XENIX as the network software, this will allow for future terminals to be DT's, known in the field as "Dumb Terminals."

We have chosen the following software applications for this proposal. Software can also be added or changed in the future, and when the system changes to network, upgrades are available for changing languages. At the time of the change, data will not have to be re-entered into the system.

- REALWORLD SYSTEM KIT
- REALWORLD SALES ANALYSIS
- SYNCHRONICS POINT OF SALE
- MS-DOS VERSION 3.30

The Synchronics POS Application software uses a RealWorld base. As the industry standard for retail marketing and

inventory applications, RealWorld is by far an ideal solution. This software will interface with bar code readers, as well as all other peripherals.

On the system, the user will be able to print bar-codes on labels attached to items for sale, attach these labels to the items, and scan the codes on the system for use in inventory control and stock management. The system will also supply the user with a customer listing. This is performed by assigning each customer with an identification number. Each time the customer returns, the sale is recorded as follows:

1. Sales clerk obtains customer ID CODE and enters it into the POS.
2. Sales clerk passes the bar-code wand over the merchandise being purchased.
3. Sales clerk enters any non-tangible services such as club rental, cleaning services, special order merchandise.
4. Sales clerk tells customer price of sale.
5. Sales clerk enters into POS type of payment.
6. Sales clerk gives receipt of sale to customer.

Items currently on sale are priced as such and will be recorded as being sold at the sale price. The Sales Analysis software can be programmed to report on how well the establishment has done on such a sale and give management ideas as to how to increase sales. Sales analysis also allows for a "Model Inventory" to be

entered by management. This is very useful when ordering stock into the establishment.

Each day, management prints up a "Daily Report" of items sold, which segregates type of payment, quantity of items or services sold, and gives the correct amount of cash, checks and credit card totals that should be deposited for that day. Also, each clerk has an ID CODE that identifies that clerk on the sales ticket. The POS can be programmed to identify sales by individuals, sales by the hour, etc., so that the management may improve scheduling.

SYSTEM HARDWARE: [Ref. 4]

Stock No.	Description	Qty	Price	Amount
250-4072	TANDY 3000NL		999.00	
	Less 20% Discount 1N		799.20	799.20
250-4082	128K MEM KIT HL		69.95	
	Less 20% Discount 1N		55.96	55.96
250-4079	60MB TAPE BACKUP		499.95	
	Less 20% Discount 1N		399.96	399.96
250-3012	VM-5 MONO MONITOR		149.95	
	Less 20% Discount 1N		119.96	119.96
250-3046	MONO TEXT ADAPTER		67.50	
	Less 20% Discount 1N		54.00	54.00
260-2818	DMP300 PRINTER		499.00	
	Less 20% Discount 1N		399.20	399.20
260-0250	250W BKUP PWR SUP		379.95	
	Less 20% Discount 1N		303.96	303.96
260-0246	60MB TAPE CRTRDGE		37.95	
	Less 20% Discount 3N		30.36	91.08
260-0223	12PRCBL 3-4000/LT		39.95	
	Less 20% Discount 1N		31.96	31.96

250-4109	MS-DOS/GWBASIC		119.95	
	Less 20% Discount 1N		95.96	95.96
260-0240	6' SHLD RS232 M-F		17.95	
	Less 20% Discount 1N		14.36	14.36
903-3279	SYNCHRONICS POS		995.00	
	Less 20% Discount 1N		796.00	796.00
903-1389	SYNCHRONICS RETAIL INVENT		795.00	
	Less 20% Discount 1N		636.00	636.00
903-2744	SYNCHRONICS CUSTOM LBL		300.00	
	Less 20% Discount 1N		240.00	240.00
903-1437	RW SYS KIT-DOS		195.00	
	Less 20% Discount 1N		156.00	156.00
SYSTEM		1N	599.00	59.00
250-4057	40MB HD KIT 40MS	1N	799.00	
250-4058	HD ONLY CONTROLLER	1N	249.95	
12 MONTH COMPUTER ON SITE TSP FOR				
250-4072	MODEL 3000 NL	1N	95.00	95.00
12 MONTH COMPUTER ON SITE TSP FOR				
250-4082	128K MEMORY KIT	1N	3.00	3.00
12 MONTH COMPUTER ON SITE TSP FOR				
250-4079	5.25 60MB INT TAPE 1N		29.50	29.50
12 MONTH COMPUTER ON SITE TSP FOR				
250-3012	VM5 MONITOR (14")	1N	22.50	22.50
12 MONTH COMPUTER ON SITE TSP FOR				
250-3046	MONOCHROME BD	1N	36.75	36.75
12 MONTH COMPUTER ON SITE TSP FOR				
260-2818	DMP 300	1N	96.75	96.75
12 MONTH COMPUTER ON SITE TSP FOR				
260-0250	BPS 250	1N	51.75	51.75
12 MONTH COMPUTER ON SITE TSP FOR				
250-4057	40 MEG INTERNAL HD 1N		75.00	75.00
12 MONTH COMPUTER ON SITE TSP FOR				
250-4058	HD CONTROLLER	1N	25.00	25.00
TRAINING AND SUPPORT, 01-3808				150.00
SYSTEM INSTALLATION				

TRAINING AND SUPPORT, 01-3802
TRAINING 4 PERSONS 8 HRS

720.00

SYSTEM TOTAL

\$6,097.85

Tandy also provided two other options to the original proposal. Their second proposal included the Tandy 2500XL which provides a faster clock speed, 384K more memory and color VGA graphics. The additional cost was \$680.00 above the first proposal.

Tandy's third proposal was a NETWORK PROPOSAL:

We suggest that if the client plans to change to a network within the first 12 months of using the system, that the network be shipped instead of the single user system. This will increase the cost of the investment in the first year, but will decrease the overall cost, in hardware, software, and time, as the network can be installed at one time, and software will not have to be repurchased and switched over to the network software. Required software would include: XENIX OPERATING SYSTEM 286, REALWORLD XENIX SYSTEM KIT, REALWORLD XENIX POS AND TANDY DT-100/CONNECTING HARDWARE, total system price \$8,091.83.

While the above systems were impressive they did not include the bar code decoder, bar code scanner (light pen) nor the software to print the labels.

C. COMPUTERLAND [Ref. 5]

Computerland's proposal was totally inadequate:

Computerland

1220-41st Avenue

Capitola, Ca 95010

(408)-476-6170

Product

286 Epson IIE Computer (Step Above ARCHIE SYSTEM)

1MB RAM, 5 1/4 1.2 Mb Drive, 40 Mb Hard Drive

EPSON 12" Monochrome Monitor with Card

Complete POS-Software Compatible with SBT Accounting

BTC Barcode Scanner

EPSON-80 Column Printer and Cable

Cash Drawer

Complete Price= \$4,495.00

The above quote did not include a power backup, a internal tape backup, training, installation or support. When Computerland was pressed for these items they stated that each store was a franchise operation and they would sell me the package but would not travel to Long Beach to install, train or maintain the equipment. Computerland of Long Beach was contacted but they never returned a proposal, stating that they have little experience in point-of-sales systems.

D. CTS CASH REGISTER AND TERMINAL SYSTEMS [Ref. 6]

CTS Cash Register and Terminal System was interested in selling the Pro Shop a software package called "Carefree" for \$750.00 which would work with the electronic cash register that they had previously sold the shop but it would not read bar codes. They were not willing to put a computer system together. They stated any IBM compatible would do.

IV. RECOMMENDATIONS

Based on the above responses from the Request For Bids it appeared that the Radio Shack proposal 01-3808 with the needed additions, (light pen, decoder, etc.) would provide the best overall system for the money. In addition to coming the closest to the Request For Bids, Tandy Corporation computers are already installed in the accounting department of Morale, Welfare and Recreation. This eliminates any compatibility problems in the future when, after training, it will be possible to transmit electronically all accounting data directly to the Long Beach Naval Base vice the tedious guard mail methods currently used. This should also eliminate costly errors and accountant's time analyzing the source of the errors. It also appeared that the Tandy system, in conjunction with the Synchronics software, was the simplest system to learn to use. Research into which bar code scanner and decoder to procure led to the following options:

- WORTHINGTON DATA SOLUTIONS: Scanner and Label Right I software \$698 with one year warranty. [Ref. 7]
- AMERICAN MICROSYSTEMS: Scanner and Print Bar II software \$829 with one year warranty. [Ref. 8]

- PERCON INC.: Decoder, wand and Writebar software \$850 with five year warranty. [Ref. 9]

Synchronics Corporation, manufacturer of the software, was contacted and they immediately recommended the Percon system for 100 percent compatibility with the point-of-sales software under consideration. [Ref. 10] Based upon their recommendations and the five year warranty, the decision was made to procure the Percon decoder, scanner and Writebar labeling software.

The Percon decoder offered additional features which made it the scanner of choice. The decoder connects directly between the computer and the keyboard. When a bar code is scanned, the computer thinks the information came from the keyboard. The keyboard is always fully active, and with the Percon system there would be no software changes. The Writebar software included with the decoder is necessary due to the fact that most golf equipment lacks the standardized Universal Product Code (UPC). Writebar interfaces with the Synchronics inventory portion of the point-of-sales system and automatically produces labels to match the inventory. When additional merchandise is added to the inventory it will instantly produce the required amount of labels. The Percon decoder is also designed to read dot matrix labels, anticipating peculiarities in ink bleed, contrast variation, and printhead positioning.

The entire process took over two months of constant pressuring of the various retailers for proposals, information about compatibility, training and installation. It was difficult to find one company willing to put a complete system together that would accomplish the stated needs. Tandy Corporation was the only company that came even close to matching the Bid Proposal. Maybe \$7,000 systems are below the threshold of the big companies considering the training and support requirements. What they did not realize was the potential for future sales within the Morale, Welfare, and Recreation organization should this system prove to be successful and a money saver. The bowling alley pro shop, sporting goods store, and recreational equipment issue are all taking a wait-and-see attitude based upon the golf course's success or failure with a computerized system.

V. CONCLUSION

Radio Shack system 01-3808 was purchased 26 February 1990 at a total cost of \$6,097.85, along with the Percon additions of \$850.04 for a total system cost of \$6,947.89, (Appendix C.) System installation was scheduled for 16 March 1990 with training to follow.

APPENDIX A

INSTALLATION

Hardware installation began 16 March 1990 as planned. During the installation process it became obvious that existing methods of accounting for inventory would have to be changed. Where in the past, shirts were listed as either men's or women's, they now could be categorized in many different ways, by color, vendor, small, medium, large etc. This allowed for much greater flexibility and it also increased the number of inventory line items from eight-hundred to between 2,500 and 3,000. All new line items would have to be generated, which was estimated to take as long as three weeks, given the current work load at the Pro Shop.

During installation, the addition of golf carts to the computerized data base provided additional, unexpected benefits. Cart usage and maintenance will be automatically tracked and monitored for unusual wear patterns, extraordinary maintenance or other unusual wear and tear.

A meeting was scheduled for Monday, 19 March 1990, with the Morale, Welfare, and Recreation Department's accountants to discuss the adequacy of the reports generated by the computer and related software. The immediate goal was to be

able to remove the current cash register and eliminate the need for sending the daily tape from the cash register to the accounting office located at the Naval Base. In addition, the account classifications generated by the computer must match the current financial report generated by the accounting department (Appendix D.) The computer will allow revenue to be broken down numerous ways: greens fees, lessons, Pro Shop sales, club cleaning, cart rental, etc.; vice program revenue alone, allowing management to better allocate resources as needed.

The Morale, Welfare, and Recreation accountants agreed to the system reports and were excited by the possibility of not having to examine the cash register tapes on a weekly basis. [Ref. 11]

Presently, inventory items are being entered along with new accounting classifications for the financial reports, after which printing of bar codes can begin, followed shortly by full system operations.

APPENDIX B

TRAINING

The bulk of the training is being provided by the Tandy Corporation Regional Office located in Garden Grove, California. The two system engineers who initially installed the system are available on-call to help with set-up and initial problems. In addition, all the hardware and software is well documented with easy-to-understand technical manuals. Pro Shop staff intend to produce a single, laminated instruction sheet for clerk referral during operation.

APPENDIX C

PURCHASE ORDERS

PURCHASE ORDER

NAVCOMPT FORM 2213 (5 PT) (REV. 3-72)	ACTIVITY NO.	DATE	PURCHASE ORDER NO.
S/N 0104-LF-706-5300	10203	2/26/90	050161

FROM:	TO:	DELIVER TO:
MORALE WELFARE AND RECREATION BLDG 398 NAVAL STATION LONG BEACH CA 90822-5000	PERCON INCORPORATED 2190 W. 11TH AVE. EUGENE OR 97404 ATTN: ROBIN FORESTER	MWR/GOLF COURSE BLDG 398 NAVAL STATION LONG BEACH, CA. 90822-5000

GENTLEMEN: Being governed by instructions, hereon, please enter our order for the following:

QUANTITY	DESCRIPTION	UNIT	PRICE	AMOUNT	UNIT
1	SERIES 10 DECODER WITH STEEL WAND PN 10-C01-11	EA	701.04	701.04	
1	SOFTWARE WRITEBAR 00-701-10	EA	149.00	149.00	
	*** LAST ITEM ***				
	TOTAL		850.04		

DATE REQUIRED	DISCOUNT TERMS	VIA	SIGNATURE OF AUTHORIZED REPRESENTATIVE
9 MARCH 1990	NET	DELIVERED	JAMES E. FITZGERALD

BILLING INSTRUCTIONS

- A. Separate invoices must be rendered for each order.
 - B. Do not pack invoice with merchandise; mail under separate cover.
 - C. Transportation charge, when applicable, must be added to invoice.
 - D. Full name and address of this activity and Purchase Order No. must appear on all documents accompanying or have reference to delivery of this order.
 - E. SEE REVERSE OF THIS SHEET FOR OTHER INSTRUCTIONS.
- NOTE: NONCOMPLIANCE WITH THESE INSTRUCTIONS WILL RESULT IN RETURN OF INVOICE AND DELAY PAYMENT.**

APPENDIX C (CONT.)

PURCHASE ORDERS

PURCHASE ORDER

NAVMCOMP FORM 2213 (5 PT) (REV. 3-72)	ACTIVITY NO.	DATE	PURCHASE ORDER NO.
S/K C104-LF-706-5300	10203	2/26/90	050162

FROM:

TO:

DELIVER TO:

MORALE WELFARE AND RECREATION
BLDG 398 NAVAL STATION
LONG BEACH CA 90822-5000

RADIO SHACK
COMPUTER CENTER
1050 DEL MONTE CENTER
MONTEREY CA. 93940
ATTN: BRUCE FAULKNER

MWR/GOLF COURSE
BLDG 398 NAVAL STATION
LONG BEACH, CA. 90822-5000

GENTLEMEN: Being governed by instructions, hereon, please enter our order for the following:

QUANTITY	DESCRIPTION	UNIT	UNIT PRICE	AMOUNT
1	250-4072 TANDY 3000XL	EA	799.20	799.20
1	250-4082 128 K MEMORY KIT	EA	55.96	55.96
1	250-4079 60MB TAPE BACKUP	EA	399.96	399.96
1	250-3012 VM-8 MONO MONITOR	EA	119.96	119.96
1	250-3046 MONO TEXT ADAPTER	EA	54.00	54.00
1	260-2818 DMP 300 PRINTER	EA	399.20	399.20
1	260-0250 250 W BACKUP PWR SUPPLY	EA	303.96	303.96
3	260-0246 60MB TAPE CARTRIDGE	EA	30.96	92.88
1	260-0223 12 PROBL 3-4000/LT	EA	31.96	31.96

DATE REQUIRED	DISCOUNT TERMS	VIA	SIGNATURE OF AUTHORIZED REPRESENTATIVE
9 MARCH 1990	NET	DELIVERED	JAMES E. FITZGERALD

BILLING INSTRUCTIONS

- A. Separate invoices must be rendered for each order.
 - B. Do not pack invoice with merchandise; mail under separate cover.
 - C. Transportation charge, when applicable, must be added to invoice.
 - D. Full name and address of this activity and Purchase Order No. must appear on all documents accompanying or have reference to delivery of this order.
 - E. SEE REVERSE OF THIS SHEET FOR OTHER INSTRUCTIONS.
- NOTE: NONCOMPLIANCE WITH THESE INSTRUCTIONS WILL RESULT IN RETURN OF INVOICE AND DELAY PAYMENT.

APPENDIX C (CONT.)

PURCHASE ORDERS

CONTINUATION SHEET
RADIO SHACK

050162

2/26/90

QUANTITY	DESCRIPTION	UNIT	UNIT PRICE	AMOUNT
1	250-4109 MS-DOS/GW BASIC	EA	95.96	95.96
1	260-0240 6' SHLV RS232 M-F	EA	14.36	14.36
1	903-3279 SYNCHRONICS PCS	EA	796.00	796.00
1	903-1389 RW RETAIL INVENT	EA	636.00	636.00
1	903-2744 SYNCHRONICS CUSTOM LABEL	EA	240.00	240.00
1	930-1437 RW SYS KIT-DOS	EA	156.00	156.00
1	250/4057 40 MB HD KIT 40 MS 250/4058 HD ONLY CONTROLLER SYSTEM	EA	599.00	599.00
1	12 MONTH COMPUTER ON SITE TSP FOR 250-4072 MODEL 3000NL	EA	95.00	95.00
1	250-4082 128K MEMORY KIT	EA	3.00	3.00
1	250-4079 5.25 60MB INT TAPE	EA	29.50	29.50
1	250-3012 VMS MONITOR (14")	EA	22.50	22.50
1	250-3046 MONOCHROME BOARD	EA	36.75	36.75
1	260-2819 DMP 300	EA	96.75	96.75
1	260-0250 EPS 260	EA	51.75	51.75
1	250-4057 40MEG INTERNAL HARD DRIVE	EA	75.00	75.00
1	250-4058 HD CONTROLLER	EA	25.00	25.00
	TRAINING AND SUPPORT 01-3808			
1	SYSTEM INSTALLATION	LOT	150.00	150.00
1	TRAINING 4 PERSONS 8 HOURS	LOT	720.00	720.00

*** LAST ITEM ***

TOTAL

TOTAL

6,097.85

THESE EXTENDED PRICES HAVE INCORPORATED A 20% DISCOUNT
SYSTEM FEBRUARY SALE PRICE

APPENDIX D

FINANCIAL STATEMENTS

SUMMARY OPERATION STATEMENT FOR THE PERIOD ENDING 31 DEC 1989

ACCOUNT	DESCRIPTION	CURRENT MONTH	% OF REVENUE	CURRENT YEAR	YTD % OF REVENUE	PRIOR YEAR	YTD % OF REVENUE
XX-301-XX	RETAIL REVENUE	27904.90	100.00	75063.64	100.00	78369.38	100.00
XX-401-XX	COST OF GOODS SOLD	17761.42	63.65	56063.55	74.69	68213.67	87.04
	Gross Profit/Loss	10143.48	36.35	19000.09	25.31	10155.71	12.96
	--Other Department Revenue--						
XX-501-XX	PROGRAM REVENUE	77955.00	73.64	261418.68	77.69	214076.90	73.20
XX-569-XX	OTHER REVENUE	75.00		123.23		0.00	
	Total Other Department Revenue	78030.00	73.66	261541.91	77.70	214076.90	73.20
	Total Department Revenue	105934.90	100.00	336605.55	100.00	292446.28	100.00
	--Department Expenses--						
XX-601-XX	SALARIES & WAGES	40037.34	37.79	120695.30	35.86	116262.89	40.44
XX-621-XX	EMPLOYER'S SHARE OF FICA	3248.35	3.07	9672.08	2.87	9526.94	3.26
XX-622-XX	ANNUAL LEAVE EXPENSE	2353.93	2.22	7282.17	2.16	5820.86	1.99
XX-623-XX	SICK LEAVE EXPENSE	610.43	0.58	2034.76	0.60	3881.09	1.33
XX-642-XX	RENTALS	957.60	0.90	957.60	0.28	-187.60	-0.06
XX-661-XX	REPAIRS & MAINT-VEHICLES	430.44	0.41	2759.34	0.82	363.67	0.12
XX-683-XX	REPAIRS & MAINT-P.F.&B.	2283.02	2.16	12120.88	3.60	10982.90	3.76
XX-685-XX	REPAIRS & MAINT-BLDG & FACIL	1092.00	1.03	2842.74	0.84	1258.00	0.43
XX-686-XX	MINOR PROPERTY	0.00	0.00	0.00	0.00	1809.72	0.62
XX-701-XX	SUPPLIES	1138.14	1.07	15055.95	4.47	19303.76	6.60
XX-703-XX	LAUNDRY	9.75	0.01	9.75	0.00	0.00	0.00
XX-721-XX	TRAVEL AND PER DIEM	800.00	0.76	845.00	0.25	140.00	0.05
XX-781-XX	ADVERTISING AND PROMOTION	1038.20	0.98	2177.67	0.65	54.00	0.02
XX-782-XX	CONFERENCE & TRAINING	0.00	0.00	0.00	0.00	125.00	0.04
XX-783-XX	CONTRACTUAL EXPENSE	96.53	0.09	482.63	0.14	499.50	0.17
XX-799-XX	MISCELLANEOUS EXPENSE	35.00	0.03	341.40	0.10	1011.67	0.35
	Total Department Expense	54130.73	51.10	177277.27	52.67	172852.40	59.11
	Department Profit/Loss	34042.75	32.14	103264.73	30.68	51380.21	17.57

APPENDIX D (CONT.)

FINANCIAL STATEMENTS

SUMMARY OPERATION STATEMENT FOR THE PERIOD ENDING 31 DEC 1989

ACCOUNT	DESCRIPTION	CURRENT MONTH	% OF REVENUE	CURRENT YEAR	YTD % OF REVENUE	PRIOR YEAR	YTD % OF REVENUE
	Activity Gen'l & Admin Expense						
XX-601-00	SALARIES AND WAGES	0.00	0.00	0.00	0.00	-45.00	-0.02
XX-641-00	UTILITIES	6673.42	6.30	22971.14	6.82	15485.42	5.30
XX-661-00	TELEPHONE AND POSTAGE	318.23	0.30	1030.32	0.31	1449.64	0.50
XX-701-00	SUPPLIES	0.00	0.00	35.16	0.01	675.79	0.23
XX-731-00	FREIGHT & TRANSPORTATION	42.37	0.04	115.61	0.03	15.61	0.01
XX-761-00	DEPR EXP-VEHICLES	261.37	0.25	784.11	0.23	0.00	0.00
XX-763-00	DEPR EXP-F.F.&E.	6870.83	6.49	21404.27	6.36	16964.33	5.80
XX-765-00	DEPR EXP-BLDG & FACIL	5.65	0.01	16.95	0.01	16.95	0.01
XX-767-00	DEPR EXP-BLDG & FACIL IMP	165.25	0.15	468.75	0.14	767.40	0.26
XX-784-00	CREDIT CARD SALES EXPENSE	213.41	0.20	709.39	0.21	400.05	0.14
	Total Activity G & A Exp	14541.53	13.73	47535.70	14.12	35730.19	12.22
	Net Activity Profit/Loss	19501.22	18.41	55729.03	16.56	15650.02	5.35
	--Other Income--						
00-812-00	CASH OVERAGE	116.01	0.11	600.55	0.18	907.15	0.31
	Total Other Income	116.01	0.11	600.55	0.18	907.15	0.31
	Total Dep/Gen'l/Other Inc	106050.91	100.00	337206.10	100.00	293353.43	100.00
	--Other Expense--						
00-912-00	CASH SHORTAGE	164.08	0.15	1247.49	0.37	1421.17	0.48
00-914-00	PRIOR FY EXPENSE ADJUSTMENT	0.00	0.00	685.12	0.20	0.00	0.00
	Total Other Expense	164.08	0.15	1932.61	0.57	1421.17	0.48
	Net Profit/Loss	19453.15	18.34	54396.97	16.13	15136.00	5.16

LIST OF REFERENCES

1. Gordon, Jack, Director, Morale Welfare, and Recreation, Memorandum, dated January 1990.
2. Telephone conversation between Paul Moreno, Pro Shop manager and the author 5 January 1990.
3. Ludwig, K. Radio Shack Proposal 01-3808, Monterey, California, 1 February 1990.
4. Tandy Corporation, 1990 Tandy Computer Catalog, Fort Worth, Texas, 1990.
5. Malliarys, N. Computerland Proposal, Capitola, California, 15 February 1990.
6. Telephone conversation between Walter Bretthauer, CTS Cash Register and Terminal Systems and the author, 31 January 1990.
7. Worthington Data Solutions, Labeling Software/Bar Code Readers, Santa Cruz, California, May 1989.
8. American Microsystems, Retail Price List, Euless, Texas June 1989.
9. Percon Incorporated, Series 10 Bar Code and Magnetic Strip Decoder/Writebar Software, Eugene, Oregon, August, 1989.
10. Synchronics, Point Of Sale/Software Product Information, Memphis, Tennessee, August, 1988.
11. Meeting between MWR accountant, Dottie Hudson, Tandy system engineer John Mundell and Pro Shop staff 19 March 1990.

INITIAL DISTRIBUTION LIST

- | | | |
|----|--|---|
| 1. | Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22304-6145 | 2 |
| 2. | Library, Code 0142
Naval Postgraduate School
Monterey, California 93943-5002 | 2 |
| 3. | Professor Leslie Zambo
Superintendent (Code AS/Za)
Monterey, California 93943-5000 | 1 |
| 4. | CDR. Eberling
Superintendent (Code AS/Eb)
Monterey, California 93943-5000 | 1 |
| 5. | Ken Ludig--Tandy Corporation
1347 Kapiolani Blvd.
Honolulu, Hawaii 96814 | 1 |
| 6. | Jack Gordon
MWR Director
Bldg. 398
Naval Station
Long Beach, California 90822-5000 | 1 |
| 7. | Paul Moreno
Navy Golf Course Manager
5660 Oranewood Ave.
Cypress, California 90630 | 1 |
| 8. | Jerry Coltellaro
CEI
Plaza Court Suite 135
545 Greentree Rd.
Turnersville, New Jersey 080012 | 1 |